

painting the skin immediately outside the erysipelatous area with some counter-irritant. The authors have studied the *rationale* of this treatment, and conclude that the irritant brings about the formation of a zone of inflammation, with dilatation of the vessels and diapedesis of the white corpuscles, which now, by destroying the micrococci, act as a barrier to the further progress of the disease. With the malignant pustule produced by the inoculation of the anthrax bacilli, similar counter-irritation was effectual in only three out of thirty cases—that is to say, with the more active virus the stimulus applied was not sufficient to produce an effectual barrier.

J. GEORGE ADAMI.

THE CHEMICAL AND BACTERIOLOGICAL EXAMINATION OF POTABLE WATERS.

Examen Químico y Bacteriológico de las Aguas Potables.

Por A. E. Salazar y C. Newman, con uno capítulo del Dr. Rafael Blanchard sobre "Los Animales Parásitos introducidos por el Agua en el Organismo." (London: Burns and Oates, 1890.)

A PECULIAR interest attaches to this work at the present moment in consequence of the sad political events now going on in the country from which it has emanated; for, whilst almost each successive day brings news of the sacrifice of human life in one of the fiercest and most sanguinary civil contests of recent years, the object of this book is to show how the latest results of scientific research may be applied to combating on the same soil some of the ills which flesh is heir to. The publication of this treatise for Chilean students affords the strongest evidence of the rapidity with which scientific knowledge traverses the globe at the present day, and it must be a source of great satisfaction to all interested in the dissemination of the principles of hygiene that there should be a demand for a work of such an advanced character in a country so remote from what we are wont to regard as the centres of civilization.

The scope of this work is more comprehensive than that of perhaps any similar one in our own language; English treatises on water analysis being in general only short manuals giving instructions for the execution of analytical methods devised by their authors, who usually dismiss the rival methods of others with a few words, often not of a very complimentary kind. The pages under review, however, not only give an interesting account of the various methods employed by water-analysts, but subject their several claims to a fair and impartial criticism, whilst detailed information is supplied for carrying out those methods which the authors regard as, on the whole, the most serviceable. Again, a most exhaustive account is given of the bacteriological examination of water, including precise instructions for the cultivation of micro-organisms, the preparation of nutritive media, the sterilization of apparatus, the use of the microscope, and the performance of inoculation experiments on animals. But even this ample programme was inadequate for the ambition of the authors, who have associated with themselves a third colleague, who contributes a bulky appendix on "the animal parasites gaining access to the organism through water." The work is not only profusely illustrated with cuts, but contains also a number of ori-

ginal photographs representing both the microscopic and macroscopic appearance of some bacteria. Indeed, the bacteriological part is the real centre of gravity of the work. A decade will soon have elapsed since the bacteriological examination of waters began to attract much attention in consequence of the ingenious method of gelatin-plate cultivation devised by Koch. It was not, however, until some years later that the method yielded results of any practical importance, inasmuch as it was at first almost exclusively applied by bacteriologists whose previous information on questions of water-supply was of a somewhat limited order, whilst the value of the method for the solution of many hitherto unsolved problems connected with the hygiene of water is even now but imperfectly appreciated by chemists. When the method was first applied to the London water-supply, in the year 1885, it at once brought to light that in the process of sand-filtration, as practised on the large scale, a most astonishing proportion of the micro-organisms present in the unfiltered water were removed, whilst in the best of our deep-well waters the number of microbes found was so small that it seemed probable that the removal of these low forms of life in this process of natural filtration was really complete, and that the few actually found had very likely been imported into the wells from the surface. On the other hand, it was shown that the sand-filters did not wholly remove the organisms present in the unfiltered water, as, in the course of regular examinations carried on over a period of more than three years, a most unmistakable relationship between the number of microbes present in the unfiltered and filtered waters respectively was discernible. The scope of the bacteriological method of examination became very much narrowed when it was discovered that there are many micro-organisms which have the power of multiplying to an enormous extent in the purest waters, including distilled water itself, so that the number of microbes present in a given sample of water affords no indication *per se* of the purity or otherwise of the water. This disturbing element in the bacterioscopic examination of water is not sufficiently emphasized by the authors. But this extraordinary phenomenon of multiplication, although it invalidates the bacteriological process for the general purposes of water examination, does not at all interfere with its successful application to the investigation of the efficiency of filtration, either natural or artificial, provided that the filtered water is subjected to examination without delay after it has undergone the process of filtration.

It should be pointed out that there exists a very widespread misapprehension as to the ideal object of the bacteriological examination of waters, and the authors of this work fall into the same error to some extent also. It is very generally supposed that the main object of a bacteriological examination is to discover whether or not there are disease-producing organisms, *e.g.* those of typhoid, in the water. But this is a point really of very limited importance, and what should be kept in view in an examination of water is the endeavour to discover, not whether the water contains zymotic poison at the time of analysis, but firstly, whether it is exposed to influences which may at any time lead to the introduction of such zymotic poisons, *e.g.* through contamination with sewage:

and secondly, whether, if such organized poisons should gain access, there is any sufficient guarantee or not that they will be destroyed or removed before the water reaches the consumer. It is because the chemical analysis affords us at present a better clue than the bacteriological examination as to whether a water has received sewage or not that it is of more general applicability than the latter; but we must appeal to a bacteriological inquiry in order to ascertain whether, in the event of sewage gaining access to the water, there is a guarantee in the subsequent history of the water that the zymotic poisons, which may at any time accompany the sewage, would undergo removal. In short, the object of nearly all water examinations is obviously to ascertain whether the water may at any time be dangerous to health, and not, even if this could be with certainty determined, whether it contains a zymotic poison at the particular moment of examination. On the other hand, the fact that the microbe, which is now pretty generally accepted as the inducing cause of typhoid fever, has been on more than one occasion actually discovered in drinking-water which was under suspicion of producing an epidemic of that disease, affords most important evidence as to the manner of its distribution.

There is much need of a similar work to this in English, as each year an increasing number of younger medical men are coming forward for the degrees in Public Health which are now granted by several of our Universities, and to these a practical and critical treatise such as this would prove of great value. It is of great importance that such Public Health students should be impressed with a sense of the responsibility which attaches to the examination of waters for domestic purposes, and that most serious mischief may and often does result from such investigations being intrusted to incompetent persons. It is gratifying to see that the authors do not undertake to prescribe any of those artificial standards of purity for drinking-water which so frequently figure in books of this kind, and which are attended with the greatest danger, leading as they do the ignorant to believe that they can pronounce upon the fitness or otherwise of water for drinking purposes from the numbers which they have obtained in a few simple quantitative determinations. For it must never be forgotten that the sanitary examination of water is surrounded with such difficulties that it is only by bringing to bear on each particular case all the evidence that it is possible to obtain, and then interpreting this evidence by the light of an extended experience, that a sound judgment can be arrived at.

P. F. F.

OUR BOOK SHELF.

Botany: a Concise Manual for Students of Medicine and Science. By Alex. Johnstone, F.G.S. (Edinburgh and London: Young J. Pentland, 1891.)

DURING recent years many books on botany have been published, specially for the use of students preparing for examinations. In these a few types and phases of plant life have been described somewhat in detail. In the present case a much wider range has been taken, the result being an illustrated botanical note-book, condensed but not meagre. In the preface the author takes it for granted that every student nowadays attends lectures

or demonstrations, and "therefore does not so much require a manual with diffuse explanations, but rather a kind of illustrated digest and general note-book, which will enable him to quickly arrange and make most effective use of the various facts and theories treated of by his teacher." A book on these lines Mr. Johnstone has been successful in producing. It consists of 260 pages and 226 illustrations. Some of the latter are the ones which seem by custom to be considered necessary for reproduction in every fresh botanical manual, while others appear to be new. The outline ones, such as those on p. 30, illustrating the branching of cells, give a much clearer idea than could be done by pages of letterpress. A short introductory chapter points out the position botany holds in science. The strictly botanical part of the work is treated of in four sections, viz. (1) morphology; (2) external morphology or organography; (3) physiology; and (4) taxonomy.

Under morphology, the structure, life-history, contents, and modifications of the cell as an individual are first treated of, after which the combinations of cells to form tissues are described, a special chapter being reserved for the consideration of systems of permanent tissues. The section on external morphology will be found very useful to beginners in systematic botany. It could be wished that the chapter on physiology, although containing much useful information in its 15 pages, had been more extended. The greater part of the remainder of the book is devoted to taxonomy, in which the leading characters of each class (arranged in ascending order) are given, followed by the names of some of the genera, which may be regarded as typical of their respective classes, and interspersed with illustrations. The orders of Angiosperms most frequently met with are represented by short diagnoses and floral diagrams. A useful glossary and index complete the book.

The arrangement throughout the book is good. The various headings, &c., printed in type differing according to their importance, have been very carefully set out, and give a good *résumé* of botany in a tabular form. As an illustrated note-book for a teacher, as well as a student, this work will be found of great use.

C. H. W.

Hand-book of the Ferns of Kaffraria. By T. R. Sim, Curator of the Botanic Garden, King Williamstown, South Africa. 66 pages, 63 plates. (Aberdeen: Taylor and Henderson, 1891.)

THIS little book contains popular descriptions and outline plates of the ferns of Kaffraria, with a chapter of definitions of the botanical terms used in describing ferns, and another giving directions how to cultivate them. The Cape, considering the general interest and remarkable individuality of its phanerogamic flora is very poor in ferns. Kaffraria yields only 68 species, about the same number as Great Britain. Amongst them are two tree ferns, a *Cyathea* and a *Hemitelia*, and several herbaceous species of a distinctly subtropical type, such as *Vittaria lineata* and *Marattia fraxinea*. Associated with these are several species with which we are familiar at home, such as *Aspidium aculeatum*, *Cystopteris fragilis*, and *Adiantum Capillus-Veneris*. No doubt by further exploration the list will be considerably increased. The author does not seem to have known anything about the Rev. R. Baur, a Moravian missionary who made large collections of ferns and other plants in Transkeian Kaffraria. The two new species which Mr. Sim claims to have added to the Cape flora cannot be admitted as novelties. *Blechnum remotum* is a variety of the American *B. hastatum*, which I do not think can stand as distinct specifically from the common Cape *B. australe*. The plant figured as *Lomaria lanceolata* on Plate 25 is no doubt *Lomaria inflexa* of Kunze, which was gathered long ago in the colony, by Gueinzus, and is beautifully figured by Kunze from specimens which he forwarded. By the aid of this book there can be no difficulty, even to an amateur, in